

PHASE-CHANGE HEAT RESERVOIR DEVICE FOR TRANSIENT THERMAL MANAGEMENT

ABSTRACT

A heat transfer system is presented for managing thermal transients, thus providing engineers greater flexibility in designing thermal solutions for applications subject to transient heat-generation. A heat reservoir device for managing a heat input subject to transient conditions includes a heat transfer subsystem having a first end and a second end, where the first end is thermally coupled to the heat input; a heat storage subsystem coupled to the second end of the heat transfer subsystem, where the heat storage subsystem comprises a phase change material responsive to the transient conditions. The excess heat load during transient operation is temporarily absorbed by the latent heat of fusion when the phase change material changes its phase from solid to liquid. Subsequently, the absorbed heat can be released back to the ambient via a heat rejection subsystem. This allows engineers to design smaller heat sinks capable of accommodating given transient conditions. This results in heat sinks which are lower cost and smaller size, or which reduce the requirement to provide higher airflow, thereby also decreasing cost and noise, and increasing reliability.

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